*JUMBO MINING CO.*

*6305 Fern Spring Cove*
*Austin, Texas 78730*
*(512) 346-4537*
*Telex # 76-7177*

February 25, 1991

Bureau of Water Pollution Control
Ground Water Protection Section
Department of Health
P.O. Box 16690
Salt Lake City, Utah 84116-0690

Attn: Mr. Mark Novak

RE: Additional information for Ground Water Permit Drum Mine

Enclosed is the additional information requested for our ground water permit at the Drum Mine. This information on the site's hydrogeology will include (1) definition of ground water flow systems(regional flow, perched aquifer flow and the inferred flow in the unsaturated zone); (2) the extent of the perched aquifer which underlies the new pad area and the water quality of the aquifer; (3) a discussion of the Busby Spring; (4) the locations of compliance monitoring wells; and (5) other information requested in your letter of Jan. 10, 1991.

## GEOLOGY

### Regional Geology

The area of western Utah around the Drum Mine was subjected to the deposition of a thick sequence of miogeoclinal marine strata during Cambrian time. The Cambrian units usually follow a definite sequence with a basal quartzite, overlain by a relatively thin shale and succeeded by a thick carbonate sequence. Miogeoclinal sedimentation continued in the region until the Mississippian.

From Mississippian to early Triassic deposition in the region occurred in local basins. Between late Triassic and early Cenozoic this portion of western Utah was uplifted during the Sevier Orogeny producing a high chain of mountains. Following the Sevier Orogeny, the area has been subjected to vertical uplift accompanying the Laramide Orogeny during late Cretaceous to early Tertiary time.

During the Oligocene (approximately 35 million years B.P.) several volcanic centers developed in western Utah within and near the Drum Mountains. The volcanic rocks produced from these centers include andesitic to rhyolitic porphyry plugs, flows and ashflow tuffs.

During the Miocene (16-19 million years B.P.) block faulting formed the present basin and range topography in western Utah. Block faulting, probably related to regional extension, and basaltic to rhyolitic volcanism have continued up to the present time. The Drum Mountains consist of a westward dipping fault block with the Cambrian rocks dipping 15-20° west.

## Drum Mine Geology

At the Drum Mine there is a typical Cambrian sequence of basal quartzite overlain by a thin shale and a thick carbonate sequence. The basal unit is the Prospect Mountain Quartzite (6500 feet thick) which is overlain by the Busby Quartzite/Pioche Shale (300-400 feet thick). The Busby/Pioche is composed of purple quartzite and thin olive green micaceous shale. A carbonate sequence consisting of thick limestones and thin shales overlie the Busby/Pioche unit. Oligocene rhyodacite flows, plugs and dikes occur in the mine area.

At the Drum Mine high angle normal faults and fractures form a northeast parallel series representing a tensional fracture resulting from movement along a larger east-west trending oblique slip fault. A secondary set of faults trending northwesterly is also present. These northeast and northwest fractures are important in controlling water flow direction and conductivity in the rhyodacite which contains the aquifer.

Geology of the Drum Mine area is shown in Plate 2.

# HYDROLOGY

There are two main properties in the Drum Mine area which control porosity and water movement--FRACTURING AND SHALE BEDS.

## Fracturing

The limestones, quartzites and rhyodacite are generally non-porous but the northwest and northeast fractures that cut these rocks have varying degrees of porosity. Fracture porosity in the limestones ranges from 100% in open fractures(solution cavities) to near 0% where they been sealed with calcite. The quartzites being more brittle have a tendency to fracture nonuniformally and porosity ranges from near zero up to 5% where fractures near faults are more uniform, denser and more parallel in direction. Fractures in the rhyodacite are generally hairline in nature and porosity is a function of the density of fractures--porosity ranges from 3.3% in high density primary fractured areas to 0.2% or less in low density secondary fractured areas.

Shale Beds

The shale beds in the Drum area have excellent hydrologic properties to conduct water along their upper contact. Except at the contacts, the lack of alteration(little or no oxidation of sulfides) suggests that oxidizing fluids (ground water) could not penetrate the shales but moved along the contacts. The fact that the ore zones lie directly on top of the shales indicate that ascending fluids traveled along the upper contact and could not penetrate through the shales.

Fracturing has a tendency to turn into the shale forming numerous bedding plane fractures in the shale (diagramically shown on cross-sections C-C' and D-D'--Plate 2). There is also the ability for shales to become structurally thickened near faults and fractures.

It is therefore concluded that shale beds in the heap area are major controls of water movement in the unsaturated zone and any leaks of existing pads can be detected by monitoring holes placed downdip of shale beds.

Hydrology--New Heap Area

The new heap area lies in the center of the rhyodacite which contains the perched aquifer. Movement of water in the aquifer is a direct function of the fracture pattern and density--water moves parallel to primary fracturing and moves faster in areas of dense fracturing. Fracture density and patterns in the rhyodacite are shown on Plate 3.

The hydraulic conductivity of the rhyodacite aquifer was determined by removing a known volume of water in each wet monitoring hole and measuring recharge rates--SLUG TEST. A hydraulic conductivity map (Plate 3) was constructed showing areas of hi and lo conductivity (based on recharge rates of the slug tests).

Water level measurements in the wet monitoring holes in the perched aquifer (taken in the same 24-hour period and calibrated to elevation above mean sea level) were used to construct a map of the potentiometric surface of the aquifer (Plate 4).

Water level flucuations occur seasonally in the aquifer. In winter and spring levels may rise from as much as 10 feet in zones of hi hydraulic conductivity to less than 0.5 foot in zones of lo hydraulic conductivity. The potentiometric surface map was constructed from water levels taken on 1-20-91.

Hydrology--Existing Heaps HG-7 and LG-2 Areas-

Existing heaps HG-7 and LG-2 lie above limestones and shales away from the perched aquifer. These shale beds have been drilled downdip (see Plate 2) and neutron logged for our 60 day test. If, after the test, there is no signs of leakage (visibly or detected by relogging the holes), Jumbo and its consultants will conduct hydraulic conductivity tests on the shales to show that water travels along the shale beds and any leakage of pads can be detected in the monitoring holes.

Jumbo requests that the Dept. of Health either (a) issues a ground water permit for the whole mine with the condition that before heaps HG-7 and LG-2 can be used Jumbo must prove that the shale beds can be used as leak detectors; or (b) a ground water permit is issued just for the new heap area and an amended permit for HG-7 and LG-2 areas will be issued after Jumbo conducts hydraulic conductivity tests of the shales.

## BASE AND HYDROGEOLOGIC MAPS

A base map (Plate 1--1"to 500') and a hydrogeologic map (Plate 4-1"to 200') were constructed to show the following:

(1) outcrop, extent and stratigraphic units (Plate 4 as well as Plate 2)

(2) the sites topography (Plate 1)

(3) location of:
- (a) permitted leach pads and related facilities (Plates 1 and 4)
- (b) subsurface excavations which may affect ground water (Plate 4)
- (c) locations of proposed monitor wells and representative dry holes which can help define the extent of water (Plate 4)
- (d) location of surface water, seeps and springs (Plates 1 and 4)
- (e) locations of surface drainages (Plate 1)
- (f) distribution and potentiometric surfaces of of the perched aquifer with detail to show flow (Plate 4)
- (g) horizontal component of the inferred ground water flow in the unsaturated zone (Plate 4 as well as Plate 2)
- (h) location of proposed compliance monitoring points (Plate 4 as well as Plates 2,3 and 5)

(4) hydrogeologic cross sections (Plate 4) showing:
- (a) flow density
- (b) rhyrodacite and shale beds
- (c) inferred flow direction in the unsaturated zone
- (d) potentiometric and lower confining surfaces

## HYDROGEOCHEMISTRY

Ten water samples from the perched aquifer were taken and the locations and analytical results are shown on Plate 5. All samples were analyzed for total cyanide and 5 of the samples were analyzed for major cations/anions, TDS, metals and conductance.

Water sample were collected after pumping of holes and allowing for water recharge(all samples were collected in the same 24 hour period). Samples were placed in prewashed and rinsed bottles supplied by Ford Chemical (separate bottle each for cyanide, cations/anions and metals).

Water locations were selected upgradient and downgradient of the new heap area as well as east of the area to cover the entire aquifer. The proposed (compliance) monitoring holes were sampled and the locations are shown on Plate 5.

More sampling will be conducted on the compliance monitoring wells once these locations are approved by the Dept. of Health.

## HYDROGEOLOGIC DESCRIPTIONS

### Monitoring Holes

A tabulation of monitoring holes is given in Table 1.showing hole #, collar elevation, hole depth, depth to water in aquifer (or dry hole) and a generalized geologic log. Holes YC65, 66, 67 and YC 81 are older holes and are buried by mining activities and, therefore, are not considered monitoring holes. H22, F24 and F47 are located on Plate 1 and all others on Plates 2, 3 and 4.

All monitoring holes are 5½ to 6" in diameter and were drilled by downhole rotary methods. A 6" surface casing was emplaced in each hole to prevent surface runoff from entering.

After the State agrees to the locations of compliance monitoring points, Jumbo will complete these wells in accordance with RCRA Groung Water Monitoring Technical Enforcement Guidance Manual(1986).

### Springs and Seeps

The only spring or seep within a one mile radius of the Drum Mine is the Busby Spring (location is shown on Plates 1,2 and 4). The Busby Spring (elev. 6143; ave. temp. is 12°C) does not flow on the surface anymore (yield and variation hard to determine) but can be sampled in an old cased drill hole. It occurs along a northeast fracture in the rhyodacite above the quartzite. Water probably flows along the fracture downward until it reaches the deep ground water system.

Since it was not possible to establish the connection between the Busby Spring and the perched aquifer, the water quality of the spring will not be used as background water for monitoring as stated in our first application.

Underground workings

The only underground workings are in the south end of the No. 1 pit (see Plates 2 and 4) and do not affect water movement in the unsaturated zone.

Regional Ground Water Flow System

The Drum Mine lies in an area of deep ground water (inferred to be 1465' beneath the new pad area)--the regional flow and receiving ground water quality are shown on Plate 6.

Generally, the regional ground water flow beneath the mine area is from east to west (probably along major east-west tear faults and fractures in the quartzites). Approximately 6 miles west of the mine (near Swasey Bottom) the regional flow turns northwest towards Fish Springs and finally to the receiving area of the South Great Salt Lake area.

Water quality is not known directly beneath the mine area but is Class II at the southern end of Fish Springs Valley grading to Class III and Class IV at the final receiving area--North Fish Springs Valley.

Local Ground Water Flow System--The Perched Aquifer

The perched aquifer is controlled by (and confined to) by the characteristics of the rhyodacite. The rhyodacite has flowed into an old paleobasin and has probably sealed the underlying limestone contact (filled the fractures and open cavities) causing it to become impermeable.

The aquifer water source is inferred to be an upflow along a intersection of dense northeast and northwest fractures (near hole MH32).

The main water flow is southwest under the new heap area along a dense primary fracture system. A minor flow is to the southeast along a less dense fracture system. The major component of flow is horizontal within the rhyodacite.

There is no discharge of the aquifer water to the surface. The eventual discharged of the aquifer (see cross-section A-A'-Plate 4) is suggested to be either (a) down shale CDS or (b) down another intersection of northeast and northwest fractures. Flow will continue downdip along the shale bed until it reaches the regional ground water table approximately 1 mile to the southwest.

Alteration does not appear to have a major role in ground water flow.

Local ground water flow systems--unsaturated zone

The inferred flow of water in the unsaturated zone (along fractures and down shale beds) has already been discussed above (Hydrology section).

Hydrochemical Description

Chemical analysis of the perched aquifer is shown of Plate 5.

There does not appear to be any major chemical changes or facies in the aquifer. MH27 is lower in calcium, magnesium, potassium, TDS and conductance but the rest of the aquifer appears homogenous. Hole MH32 (inferred source area) has about the same water chemistry as MH18 (center of new pad area) and MH35 (downgradient of new pad area) with just minor differences in sodium, arsenic and chloride. MANGANESE, MERCURY

Previous mining activities had only minor affects on the aquifer quality. Total cyanide was detected in only one sample (MH40) and it was 0.016mg/L (or 2.3% of drinking water standards).

Since the fracturing of the rhyodacite determines the hydraulic conductivity and shape of the aquifer, it appears that the fracturing is adequate to provide movement and homogenization of the aquifer water.

Hydraulic conductivity variability

Hydraulic conductivity of the rhyodacite (which contains the aquifer) with zones of hi and lo conductivity is shown on Plate 3 and cross section B-B' (Plate 4).

As stated before, fracturing controls the conductivity. Water flows parallel to fracturing and moves faster in zones of dense fractures. The fracture pattern can be highly impermeable for water moving perpendicular to fracturing--fracture pattern can act as a dam in confining the water aquifer as seen by the steep walls of the aquifer along the northwest, north and northeast sides (see cross-sections A-A' and B-B'--Plate 4).

The hydraulic variability of the shales beneath heaps HG-7 and LG-2 will be given later after the 60 day test.

## BACKGROUND WATER QUALITY

New Heap Area

The perched aquifer (uppermost aquifer) will be used for background water quality. Analysis of water samples taken from the aquifer are shown on Plate 5. The high TDS (ave. 6117) of the water would classify it as Class III.

Four proposed monitoring holes have been selected--MH32 (upgradient) and MH 35, 40, and 44 (downgradient). Jumbo feels that three downgradient points are adequate because (1) holes lie on the same northeast fracture pattern which underlies the new heap area and (2) the aquifer is narrow below the heap area and three holes are adequate to cover it.

After points are approved, monitoring wells will be completed according to OSWER 9950.1 (1986).

Also after approval, water samples will be collected according to EPA Guidance Document and analyzed for the parameters required.

Four replicate samples will be taken from each point over four consecutive quarters. Sampling will be on-going while the permit is in effect.

Heaps HG-7 and LG-2

As stated above, Jumbo will conduct hydraulic conductivity tests on the shales after or during the 60 day test. Along with possible vadose monitoring Jumbo will show that these shale beds can detect leaks and that the compliance monitoring points will be holes drilled into the shale downdip from the heaps.

Since the relationship of the Busby Spring water and these heaps is not known, the spring will not be used as background monitoring.

The deep regional ground water would be impractical to monitor. Jumbo and the Dept. of Health will have to agreed on some other measures of monitoring.

## GROUND WATER DISCHARGE CONTROL PLAN

New Heap Area

The new pad will be built to prevent any release of fluids. A construction permit will be obtained from the Bureau of Water Pollution Control before construction begins. CBC Enviro of Salt Lake is designing the pad and plans will be filed with the Bureau.

Heaps HG-7 and LG-2

After the 60 day test, Jumbo will show that the shale beds will and would have detected any leaks.

## COMPLIANCE MONITORING PLAN

New Heap

The new pad will be constructed to prevent or contain any leaks. Regular monitoring of the leak detection system and compliance points will be done on regular intervals.

Heaps HG-7 and LG-2

Plans to monitoring these heaps (e.g. vadose monitoring, shale bed monitoring, geophysical methods, etc.) will be submitted during or after the 60 day test.

## CLOSURE AND POST CLOSURE PLANS

Closure plans for the existing heaps should have already been filed with the Bureau (as well as DOGM) by Western States Minerals (original application). Since there is no time limit for closure under the current permit of existing heaps, heaps (old and new) will be neutralized, stabilized, reclaimed and monitored together after the termination of mining activities. It is impractical to neutralize one set of heaps with a neutral pH solution while sprinkling another set (new heap, HG-7 and LG-2) with a high pH/cyanide solution while using the same process ponds.

The existing heaps will remain in the closed system (no rain runoff will be allowed to discharge) and their leak detection systems and runoff will be monitored until closure. Since previous leaks of older pads were found to be minor (contamination of the aquifer was well below drinking water standards or non-exsistence), the pads impose no danger of greater contamination (especially when no new cyanide is being added).

In General, closure plans for all heaps will be as follows:

(1) neutralization of heaps by slowly lowering the pH of sprinkling water until cyanide in runoff is below the protection limits;

(2) reshaping the slopes of heaps to 3:1 (DOGM reg.)

(3) sampling of reshaped material to determine if any residual cyanide remains in the rock which may require additional rinsing;

(4) replacement (on top and sides) of any soil stockpiled at the mine to a uniform depth; — AMOUNT OR DEPTH?

(5) reseeding at a rate of 20#/acre using a mixture already approved by DOGM and BLM;

(6) continuing post-mining monitoring of heaps until stabilization has occurred.

All heaps are bonded with DOGM to insure reclamation is completed.

Jumbo will contact the Bureau of Water Pollution Control near the end of mining activitites for guidance on specific closure criteria.

CONTINGENCY PLAN

New Heap

As stated in our original application, that if a leak occurs, then that section of the heap will be closed and the leak located and repaired if economics justify the expense. Location of the leak (after presence of solution is discovered in a section of the leak detection layer underneath the secondary liner) will be determined by one or both of the following:

(1) systemically turn off sprinkler lines above (upgradient) the leak discovered in the leak detection layer--starting with the uppermost line. After a time interval and there is no decrease in volume of the leak, then turn off the next line below, and so on, (keeping all lines above off) until the leak in the detection layer slows in volume. If sufficient amount of time is allowed between shutdown of individual lines, the exact line should be located. Sections of that line can be tested similiarly;

(2) using a tracer (e.g. potassium) as follows:
   - (a) turn off all lines above the leak discovered in the leak detection layer,
   - (b) open lowermost line (above the leak)
   - (c) add tracer to barren solution
   - (d) if after a certain time interval the tracer does not show up in the leak, then open the next line uphill--continue opening lines going uphill on intervals until the tracer shows up in the leak. After the tracer is detected, then check sections of the last line opened.

Once the section of the heap is determined to be the source of the leak, lines above should also be checked.

Once a leak is located, it will be determined if it is worthwhile to remove the ore and repair the pad or keep that section and all sections (above) which may drain towards the area of leakage permanently shut off. If repair work is decided, then all sections that drain towards the area being repaired will remain off until the leak is fixed.

If a leak is detected in the monitoring holes but not in the leak detection layer, then the entire heap will be shut down and the leak located using the same methods described above (but using a longer time interval).

Also if a leak is detected, no new cyanide will be added to the solution until the leak stops (by repairing the leak or termination of sprinkling in that section of the leak).

Heap HG-7 and LG-2

The contingency plan for these heaps will be filed after the 60 day test.

CORRECTIVE ACTION PLAN

Since the extent and severity of the contamination in the perched aquifer is very minimal (well below protective limits for cyanide), no action is planned

SINCERELY,

Dave Hartshorn

DAVE HARTSHORN-PROJECT MANAGER
DRUM MINE
JUMBO MINING

TABLE 1
TABULATION OF MONITORING HOLES

| HOLE # | COLLAR ELEV. | DEPTH | WATER DEPTH | GENERALIZED GEOLOGY LOGS |
|---|---|---|---|---|
| 1 | 5951 | 66' | 30' | 0-66' unaltered rhyodacite |
| 2 | 5942 | 100' | 55' | 0-100' unaltered rhyodacite |
| 3 | 5934 | 124' | 62' | 0-30' altered rhyodacite; 30-124' unaltered rhyodacite |
| 4 | 5927 | 100' | DRY | 0-100' altered rhyodacite |
| 5 | 5929 | 100' | DRY | 0-100' altered rhyodacite |
| 6 | 5925 | 100' | DRY | 0-100' altered rhyodacite |
| 7 | 5954 | 139' | 29' | 0-139 unaltered rhyodacite |
| 8 | 5958 | 50' | 30' | 0-50' unaltered rhyodacite |
| 9 | 5967 | 50' | 40' | 0-50' unaltered rhyodacite |
| 10 | 5964 | 50' | 23' | 0-50' unaltered rhyodacite |
| 11 | 5970 | 325' | DRY | 0-75' unaltered rhyodacite; 75-195' limestone CCL; 195-270' shale CBS; 270-325' limestone CAL |
| 12 | 5967 | 202' | DRY | 0-65' unaltered rhyodacite; 65-190' limestone CCL; 190-202' shale CBS |
| 13 | 5892 | 101' | DRY | 0-20' shale CDS; 20-101' limestone CCL |
| 13A | 5915 | 100' | DRY | 0-30' shale CDS; 10-100' limestone CCL |
| 14 | 5947 | 44' | DRY | 0-10' shale CDS; 10-44' limestone CCL |
| 15 | 5880 | 204' | DRY | 0-204' limestone CEL |
| 16 | 5940 | 66' | DRY | 0-66' unaltered rhyodacite |
| 17 | 5962 | 49' | 21' | 0-49' unaltered rhyodacite |
| 18 | 5972 | 49' | 21' | 0-49' unaltered rhyodacite |
| 19 | 5987 | 71' | 22' | 0-71' unaltered rhyodacite |
| 20 | 5950 | 165' | DRY | 0-80' unaltered rhyodacite; 80-165 limestone CCL |
| 21 | 5955 | 100' | DRY | 0-100 altered rhyodacite |
| 22 | 5810 | 285' | DRY | unknown-no log |
| 23 | 5998 | 105' | 26' | 0-105' unaltered rhyodacite |
| 24 | 6006 | 105' | 21' | 0-105' unaltered rhyodacite |
| 25 | 6005 | 105' | 32' | 0-105' unaltered rhyodacite |
| 26 | 6013 | 106' | DRY | 0-60' unaltered rhyodacite; 60-106' limestone CCL |
| 27 | 5995 | 105' | 21' | 0-105' unaltered rhyodacite |
| 28 | 5990 | 105' | 103' | 0-85' unaltered rhyodacite; 85-105' limestone CCL |

TABLE 1 (cont.)

| HOLE # | COLLAR ELEV. | DEPTH | WATER DEPTH | GENERALIZED GEOLOLIC LOGS |
|---|---|---|---|---|
| 29 | 5921 | 144' | DRY | 0-25' shale CBS; 25-144' limestone CAL |
| 30 | 6011 | 144' | DRY | 0-144' limestone CAL |
| 31 | 5967 | 100' | 19' | 0-100' unaltered rhyodacite |
| 32 | 6015 | 105' | 29' | 0-105' unaltered rhyodacite |
| 33 | 5957 | 105' | 19' | 0-10' altered rhyodacite; 10-105' altered rhyodacite |
| 34 | 5949 | 105' | 9' | 0-105' unaltered rhyodacite |
| 35 | 5940 | 105' | 15 | 0-105' unaltered rhyodacite |
| 37 | 5941 | 165' | DRY | 0-165' altered rhyodacite |
| 38 | 5990 | 150' | DRY | 0-55' shale CDS; 55-150' limestone CCL |
| 39 | 6009 | 150 | DRY | 0-150' limestone CCL |
| 40 | 5924 | 48' | 15' | 0-10' altered rhyodacite 10-48' unaltered rhyodacite |
| 41 | 5961 | 105' | DRY | 0-105' unaltered rhyodacite |
| 42 | 6032 | 165' | DRY | 0-30' altered rhyodacite; 30-165' unaltered rhyodacite |
| 43 | 6009 | 145' | DRY | 0-70' altered rhyodacite; 70-110' unaltered rhyodacite; 110-145' altered rhyodacite |
| 44 | 5923 | 100' | 21' | 0-40' altered rhyodacite 40-100' unaltered rhyodacite |
| 82 | 5905 | 80' | DRY | 0-65' LS CEL; 65-80' shale CDS |
| 83 | 5895 | 90' | DRY | 0-80' limestone CEL; 80-90' shale CDS |
| 86 | 5879 | 125' | DRY | 0-120' limestone CEL; 120-124' SH CDS |
| 91 | 5845 | 165' | DRY | 0-165' limestone CEL |
| 92 | 5859 | 295' | DRY | 0-35' LS CEL; 35-60' Sh CDS; 60-105' limestone CCL; 105-295' shale CBS |
| 95 | 5966 | 165' | DRY | 0-155' Ls CC[illegible]S |
| YC65 | 5940 | 505' | DRY | 0-125' rhyod[illegible]CL; 170-260' sha[illegible]CAL |
| YC66 | 5923 | 505' | DRY | 0-360' limes[illegible]hale CBS; 420-505[illegible] |
| 67 | 5918 | 230' | DRY | 0-9' rhyodac[illegible]e CCL |
| Y681 | 5937 | 204' | DRY | 0-204' rhyod[illegible] |
| F24 | 6248 | 1000' | DRY | 0-90' oxidized latite porphyry 90-1000' unoxidize latite porphyry |
| F47 | 6165 | 1450' | DRY | 0-120' altered/oxidized latite por. 120-1450' unoxidized latite porphyry |

WHERE ARE HOLES F24 & F47?
ANS → PLATE 1

This page is a reference page used to track documents internally for the Division of Oil, Gas and Mining

Mine Permit Number M0270007 Mine Name Drum Mine

Operator Western State minerals Date 2-25-1991

TO ______________ FROM ______________

__CONFIDENTIAL __BOND CLOSURE __LARGE MAPS X EXPANDABLE

__MULTIPUL DOCUMENT TRACKING SHEET __NEW APPROVED NOI

__AMENDMENT _OTHER Binder

Description YEAR-Record Number

__NOI X Incoming __Outgoing __Internal __Superceded

Additional Information for Ground Water

__NOI __Incoming __Outgoing __Internal __Superceded

__NOI __Incoming __Outgoing __Internal __Superceded

__NOI __Incoming __Outgoing __Internal __Superceded

__TEXT/ 81/2 X 11 MAP PAGES __11 X 17 MAPS __LARGE MAP

COMMENTS: ______________

CC: ______________

TABLE 1 (cont.)

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|---|---|---|---|---|
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| 30 | 6011 | 144' | DRY | 0-144' limestone CAL |
| 31 | 5967 | 100' | 19' | 0-100' unaltered rhyodacite |
| 32 | 6015 | 105' | 29' | 0-105' unaltered rhyodacite |
| 33 | 5957 | 105' | 19' | 0-10' altered rhyodacite; 10-105' altered rhyodacite |
| 34 | 5949 | 105' | 9' | 0-105' unaltered rhyodacite |
| 35 | 5940 | 105' | 15 | 0-105' unaltered rhyodacite |
| 37 | 5941 | 165' | DRY | 0-165' altered rhyodacite |
| 38 | 5990 | 150' | DRY | 0-55' shale CDS; 55-150' limestone CCL |
| 39 | 6009 | 150 | DRY | 0-150' limestone CCL |
| 40 | 5924 | 48' | 15' | 0-10' altered rhyodacite 10-48' unaltered rhyodacite |
| 41 | 5961 | 105' | DRY | 0-105' unaltered rhyodacite |
| 42 | 6032 | 165' | DRY | 0-30' altered rhyodacite; 30-165' unaltered rhyodacite |
| 43 | 6009 | 145' | DRY | 0-70' altered rhyodacite; 70-110' unaltered rhyodacite; 110-145' altered rhyodacite |
| 44 | 5923 | 100' | 21' | 0-40' altered rhyodacite 40-100' unaltered rhyodacite |
| 82 | 5905 | 80' | DRY | 0-65' LS CEL; 65-80' shale CDS |
| 83 | 5895 | 90' | DRY | 0-80' limestone CEL; 80-90' shale CDS |
| 86 | 5879 | 125' | DRY | 0-120' limestone CEL; 120-124' SH CDS |
| 91 | 5845 | 165' | DRY | 0-165' limestone CEL |
| 92 | 5859 | 295' | DRY | 0-35' LS CEL; 35-60' Sh CDS; 60-105' limestone CCL; 105-295' shale CBS |
| 95 | 5966 | 165' | DRY | 0-155' Ls CCL; 155-165' shale CBS |
| YC65 | 5940 | 505' | DRY | 0-125' rhyodacite; 125-170' Ls CCL; 170-260' shale CBS; 260-505' Ls CAL |
| YC66 | 5923 | 505' | DRY | 0-360' limestone CCL; 360-420' shale CBS; 420-505' limestone CAL |
| 67 | 5918 | 230' | DRY | 0-9' rhyodacite; 9-230' limestome CCL |
| Y681 | 5937 | 204' | DRY | 0-204' rhyodacite |
| F24 | 6248 | 1000' | DRY | 0-90' oxidized latite porphyry 90-1000' unoxidize latite porphyry |
| F47 | 6165 | 1450' | DRY | 0-120' altered/oxidized latite por. 120-1450' unoxidized latite porphyry |

This page is a reference page used to track documents internally for the Division of Oil, Gas and Mining

Mine Permit Number M0270007 Mine Name Drum Mine
Operator Western State Minerals Date 2-25-1991
TO ______ FROM ______

__CONFIDENTIAL __BOND CLOSURE __LARGE MAPS X EXPANDABLE
__MULTIPUL DOCUMENT TRACKING SHEET __NEW APPROVED NOI
__AMENDMENT _OTHER Binder

Description YEAR-Record Number

__NOI X Incoming __Outgoing __Internal __Superceded

Additional Information for Ground Water

__NOI __Incoming __Outgoing __Internal __Superceded

__NOI __Incoming __Outgoing __Internal __Superceded

__NOI __Incoming __Outgoing __Internal __Superceded

__TEXT/ 81/2 X 11 MAP PAGES __11 X 17 MAPS __LARGE MAP

COMMENTS: ______

CC: ______